Physics impact of PID (Bs->4h)

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Motivation

・ Study of the impact of the PID performance on the physics is important piece

・ As a coherent study with B(Bs)->hh study, decay modes including 4 charged mesons is evaluated.

・Channel : Bs^0 -> Dsπ/DsK, Ds->KKπ

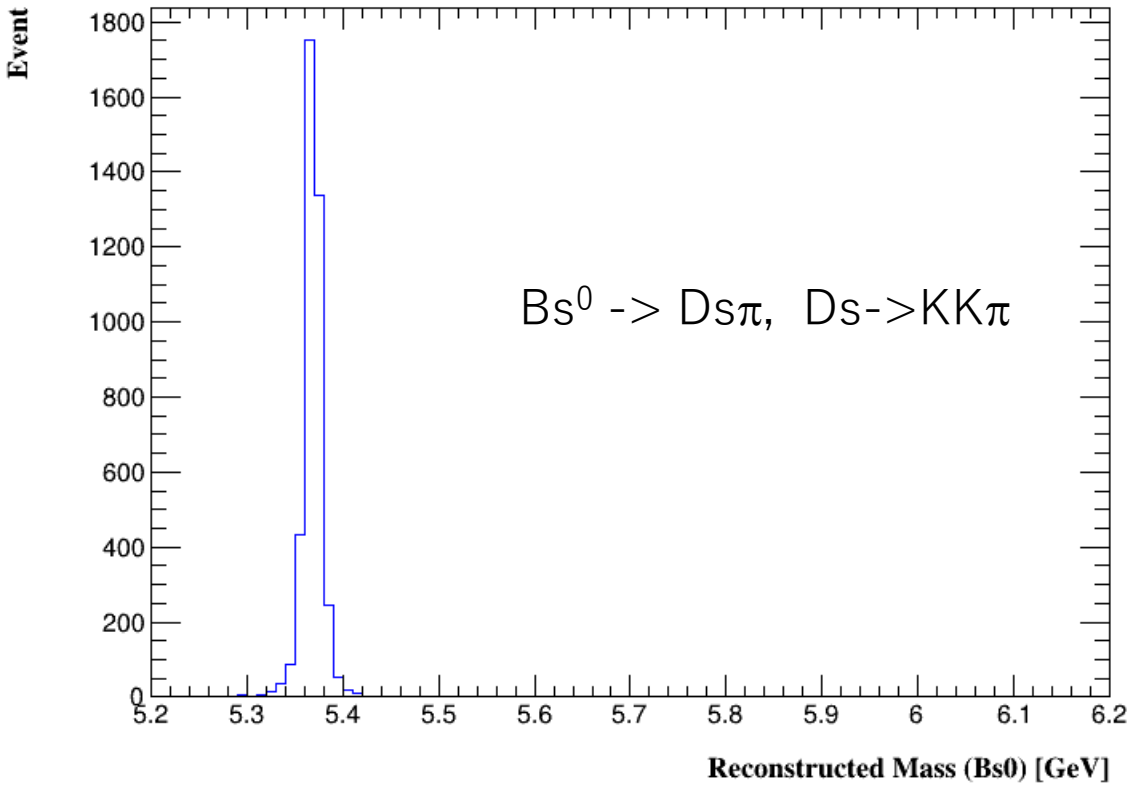
Update from previous status

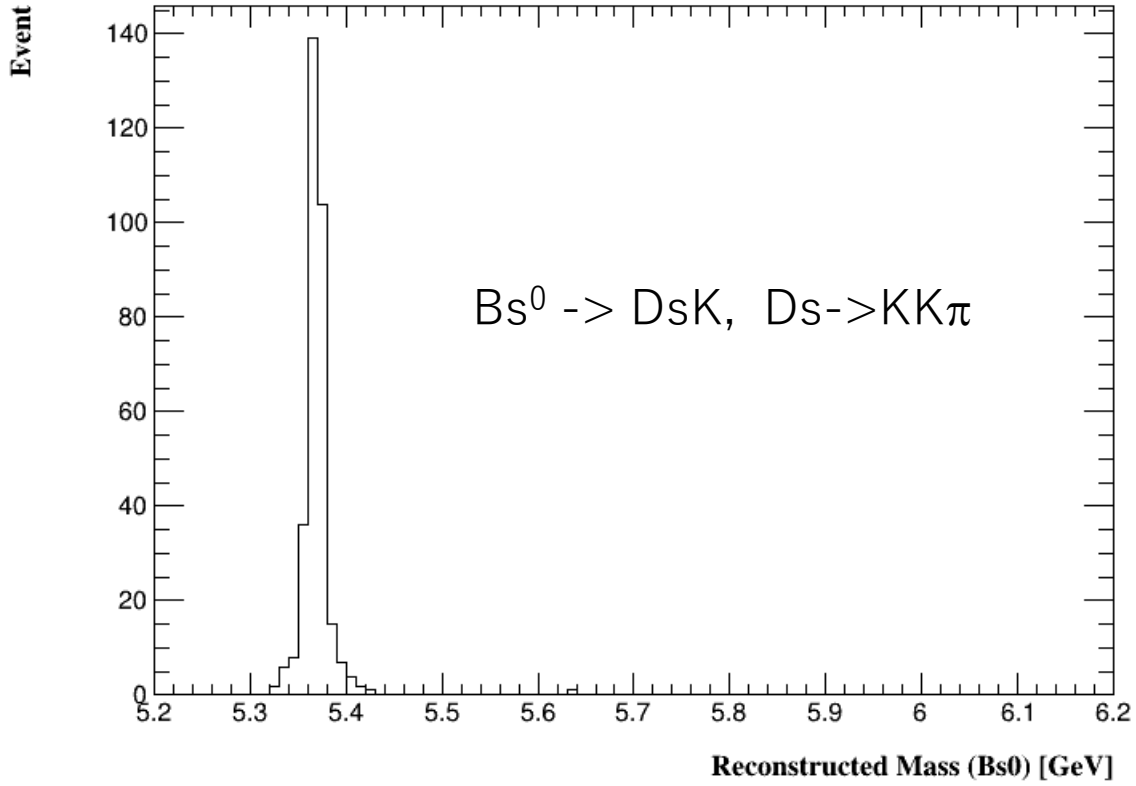
・ To increase the statistics, MC samples are newly generated using the Pythia generator and events including desired decay modes are only saved. Simulation and Reconstruction with the CEPC_v4 configuration is done accordingly.

・ The π-K misidentification probability is now assumed over wide range of its momentum.

(・ For the rest of data analysis process, is following the one in previous.)

Reconstructed Bs^0 mass distribution

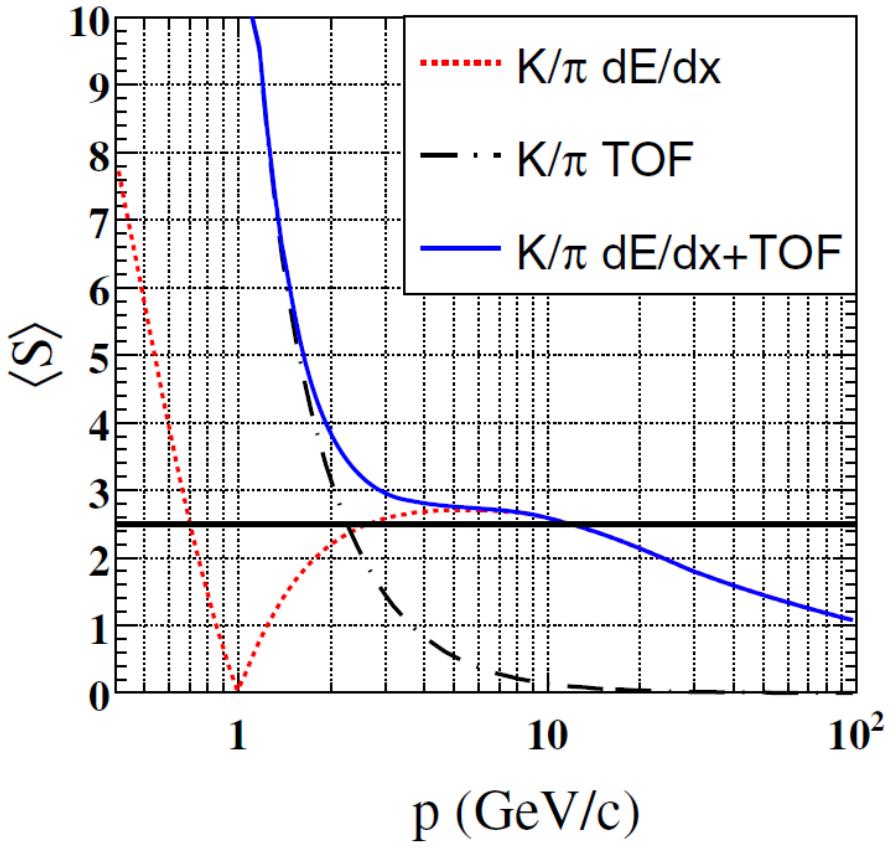




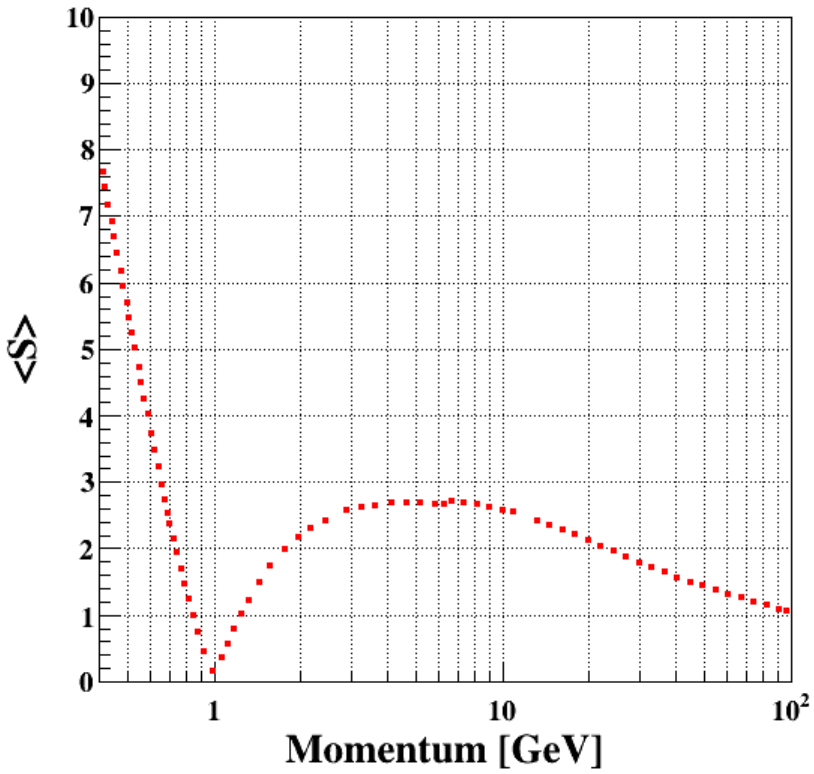
the yield ratio between Bs^0 -> Dsπ and Bs^0 -> DsK is adjusted to their BRs ratio

Pi-K separation

For the moment, referring the K/p separation power only estimated from dE/dx, shown in the paper below as a starting point.



Read the "red" & "blue" (>6.5GeV) curve by a tool and download the data to a csv format file.



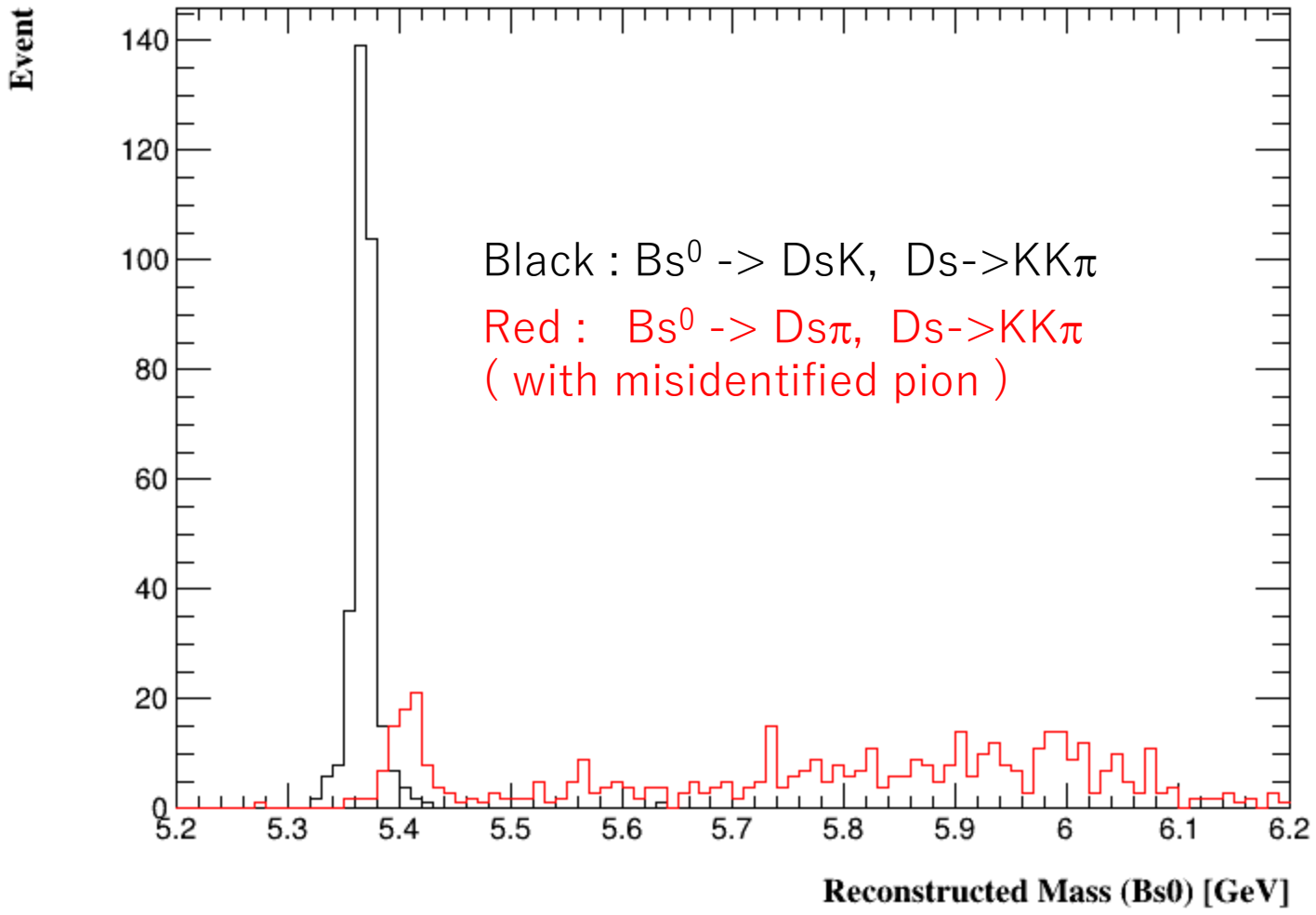
From, F. An et. al., "Monte Carlo study of particle identification at the CEPC using TPC dE/dx information", EPJC 78 (2018) 464

https://link.springer.com/article/10.1140%2Fepjc%2Fs10052-018-5803-3

Bs0->DsK and Bs0->Dsπ with wrong PID

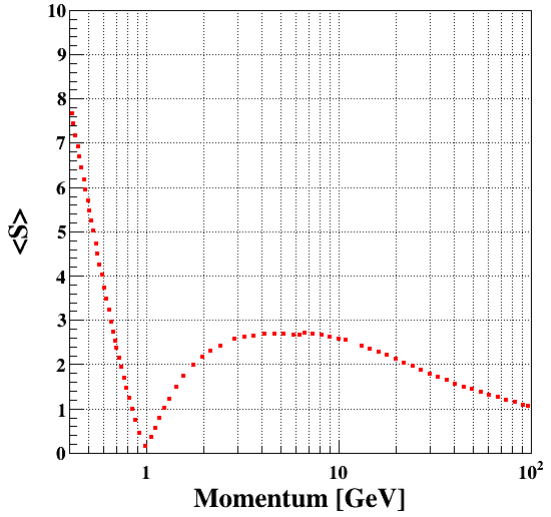
・Applying the PID misidentified rate (π->K) according to the previous page,
“Bs0 -> Dsπ, Ds->KKp
“ as a background is overplotted to Bs0->DsK

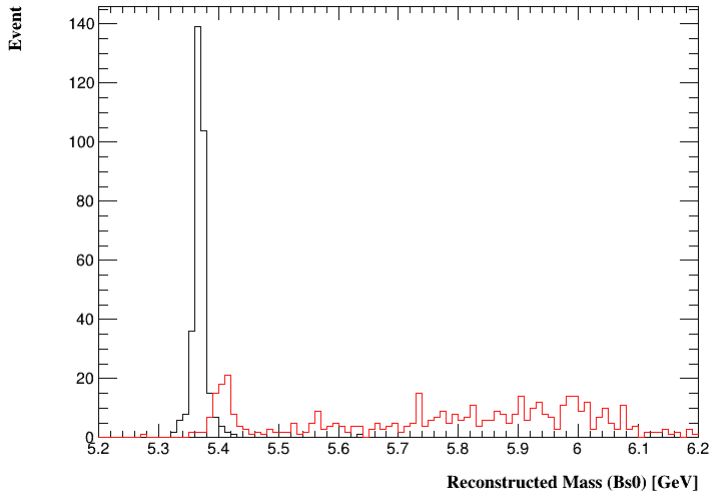
both of bachelor pion and decay pion from Ds is flipped. (latter could be further suppressed by looking the Ds mass distribution)



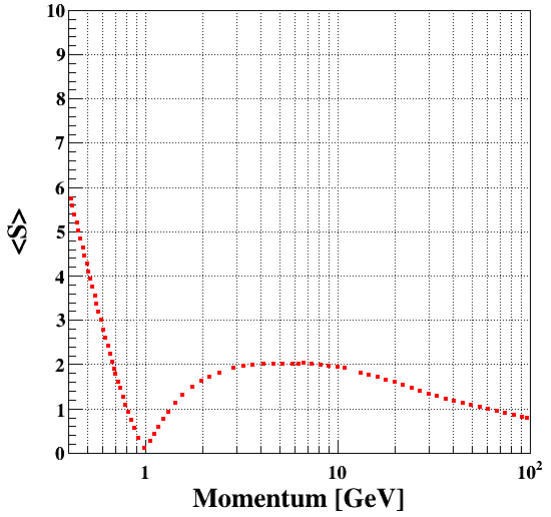
- Quick look : Change the PID separation power -

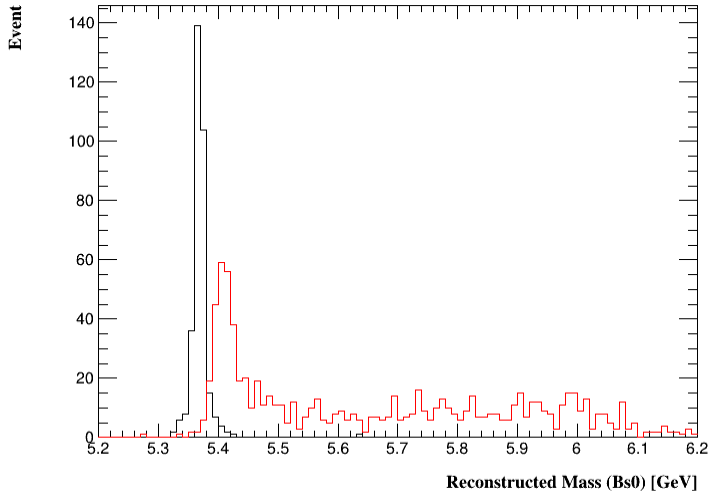
Original <S>



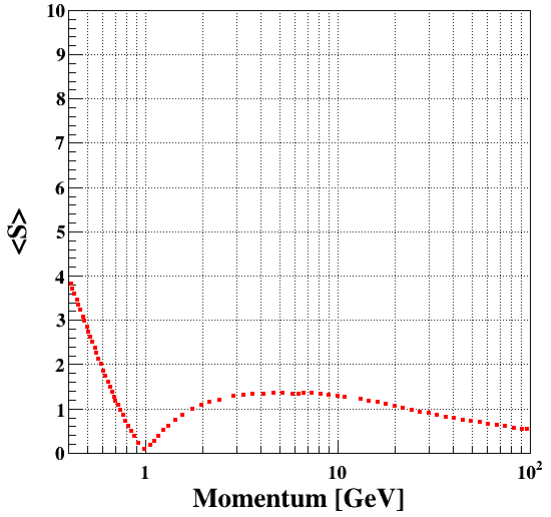


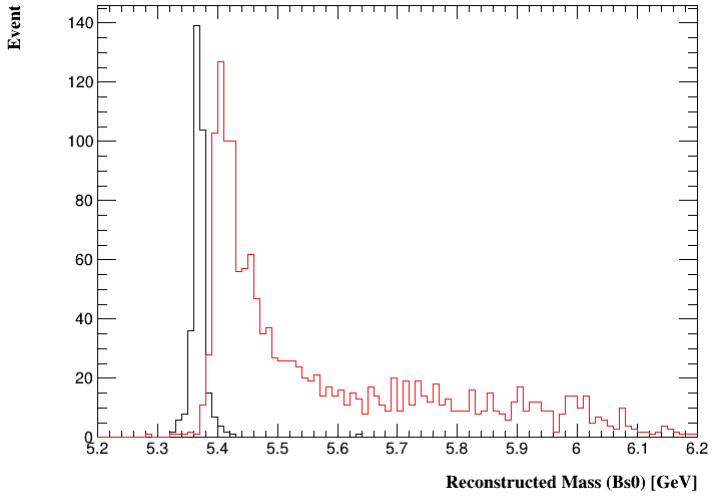
<S> × 0.75





<S> × 0.50





Summary

・Quick evaluation of overlap of the Bs0->DsK/DsPi is done to see the impact of PID performance on the physics outcome.

・As for the next step,

- See the impact by changing the detector configuration, i.e. radius
- Reflect latest PID performance on the CRD (wi/wo TOF)